Original Article

Evaluation of risk factors for diabetic nephropathy among newly diagnosed type 2 diabetic subjects: preliminary report from a tertiary care hospital of Bangladesh

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Abstract

Background: *Diabetes mellitus (DM) is the leading cause of chronic kidney disease through-out the world and half of the type 2 DM (T2DM) patients remain undiagnosed. During diagnosis, one-third to half of the T2DM patients may have different macro- and micro-vascular complications including diabetic nephropathy. This study aimed to evaluate selected risk factors for diabetic nephropathy among newly detected T2DM subjects.*

Methods: *A case-control study was done at out-patient department of BIRDEM General Hospital, Dhaka, Bangladesh from October 2016 to June 2017. Newly detected (<3 months) adult (≥18 years) T2DM patients were included in this study. Patients with diagnosed kidney diseases, features of glomerulonephritis, systemic diseases like systemic lupus erythematosus and vasculitis, history of recent fever and exercise, urinary tract infection and pregnancy were excluded. Patients with urine albumin-creatinine ratio (UACR) ≥30 mg/g in at least two (of three, if done) samples were cases and those with UACR <30 mg/g were controls.*

Results: *Total patients were 100, including 35 cases [microalbuminuria (UACR 30-299 mg/g) = 33 and overt proteinuria (UACR ≥300 mg/g) = 2] and 65 controls. Mean age was 46.6±12.3 years and there was female predominance (male:female ratio was 1:2). One-fourth patients were smokers, half were hypertensive and two-fifths had dyslipidaemia. Three-fourths of the study participants had positive family history of DM and two-fifths had family history of diabetic nephropathy. Mean body mass index (BMI) was 26.26±2.97 kg/m^2. Mean fasting blood glucose (mmol/L), 2-h post glucose value (mmol/L) and mean glycated haemoglobin (HbA1c) (%) were 9.2±2.9, 14.5±4.1 and 7.9±1.3 respectively. Eighty percent of the patients were asymptomatic regarding DM. Besides nephropathy, other chronic complications of DM were diabetic retinopathy (17%), neuropathy (11%), coronary artery disease (11%) and cerebrovascular disease (4%). Regarding risk factors for diabetic nephropathy, family history of DM (OR 1.62, p 0.0001) and diabetic nephropathy (OR 25.13, p 0.003), presence of hypertension (OR 4.93, p 0.001) and coexisting diabetic retinopathy (OR 14.18, p 0.046) were significant. On multivariate logistic regression, family history of DM (OR 1.77, p 0.001) and diabetic nephropathy (OR 24.31, p 0.001), higher BMI (>25 kg/m^2) (OR 2.11, p 0.013), hypertension (OR 4.31, p 0.003) and diabetic retinopathy (OR 14.09, p 0.021) were significant.*

Conclusions: *One-third of the newly detected T2DM subjects had diabetic nephropathy in this study. Family history of DM and nephropathy, higher BMI, presence of hypertension and diabetic retinopathy were significant risk factors for diabetic nephropathy.*

Key words: *diabetic nephropathy, new, risk factors, type 2 diabetes mellitus.*

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Introduction

The prevalence of diabetes mellitus (DM) is increasing through-out the world and this rise is mostly contributed by the increasing prevalence of type 2 DM (T2DM).[1] DM is the leading cause of chronic kidney disease (CKD) in developed countries and is rapidly becoming the number one cause for CKD in developing countries.[2-6] Patients with T2DM pass through pre-diabetic stages [impaired fasting glucose (IFG) and impaired glucose tolerance (IGT)] and half of the T2DM patients remain undiagnosed.[4] During diagnosis, one-third to half of the T2DM patients may have different macro- and micro-vascular complications including

diabetic nephropathy.[3-7] Such statistics and related risk factors among Bangladeshi population are lacking. So, the present study was designed to evaluate risk factors for diabetic nephropathy among newly detected T2DM subjects.

Methods

A case-control study was done at out-patient department (OPD) of Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders (BIRDEM) General Hospital, Dhaka, Bangladesh from October 2016 to June 2017. Newly detected (<3 months), adult (≥18 years), T2DM patients of either sex, who underwent test for urine albumin-to-creatinine ratio (UACR), at least twice, at least 6 weeks apart, in a 6-month period, were included in this study. Patients with diagnosed kidney diseases, features of glomerulonephritis, systemic diseases like systemic lupus erythematosus and vasculitis, history of recent fever and exercise, urinary tract infection and pregnancy were excluded. Patients with UACR ≥30 mg/g in at least two of three (if done) samples were cases and those with UACR <30 mg/g were controls.

Results

Total patients were 100, including 35 cases [microalbuminuria (UACR 30-299 mg/g) = 33 and overt proteinuria (UACR ≥300 mg/g) = 2] and 65 controls. Mean age was 46.6±12.3 years and there was female predominance (male:female ratio was 1:2). Base-line characteristics are shown in Table I.

One-fourth patients were smokers, half were hypertensive and two-fifths had dyslipidaemia. Three-fourths of the study participants had positive family history of DM and two-fifths had family history of diabetic nephropathy. Mean body mass index (BMI) was 26.26±2.97 kg/m^2. Mean fasting blood glucose (mmol/L), 2-h post glucose value (mmol/L) and mean glycated haemoglobin (HbA1c) (%) were 9.2±2.9, 14.5±4.1 and 7.9±1.3 respectively. Eighty percent of the patients were asymptomatic regarding DM. Besides nephropathy, other chronic complications of DM were diabetic retinopathy (17%), neuropathy (11%), coronary artery disease (11%) and cerebrovascular disease (4%).

Regarding risk factors for diabetic nephropathy, family history of DM (OR 1.62, p 0.0001) and diabetic

Table I Base-line characteristics of the study participants (N=100)

Characteristics	Total (N=100)	Cases (35)	Controls (65)
Male (33): female (67)	1:2	1:1.7	1:2.25
Mean age (years)	46.64±12.29	50.14±9.81	44.75±13.12
Hypertension	50	26	24
Known	33	23	10
New	17	3	14
Dyslipidaemia	46	26	20
Smoker	24	10	14
Family history of diabetes mellitus	75	35	40
Family history of diabetic nephropathy	39	29	10
BMI (kg/m^2)	26.26±2.97	28.27±3.24	25.18±2.16
Mean FBG (mmol/L)	9.20±2.90	9.90±1.89	8.83±3.28
Mean 2-h value (mmol/L)	14.53±4.10	15.11±2.52	14.21±4.72
Mean HbA1c (%)	7.96±1.34	8.18±1.11	7.85±1.44

BMI = body mass index, FBS = fasting blood glucose, HbA1c = glycated haemoglobin

nephropathy (OR 25.13, p 0.003), presence of hypertension (OR 4.93, p 0.001) and coexisting diabetic retinopathy (OR 14.18, p 0.046) were significant (Table II).

Table II Risk factors for diabetic nephropathy among newly diagnosed T2DM subjects (N=100)

Risk factor	Odds ratio	p value
Age	0.33	0.076
Sex	1.34	0.233
Hypertension	4.93	0.001
Smoker	1.45	0.136
Family history of diabetes mellitus	1.62	0.0001
Family history of diabetic nephropathy	25.13	0.003
BMI	0.256	0.023
Presence of diabetic retinopathy	14.18	0.046
HbA1c	2.48	0.275

T2DM = type 2 diabetes mellitus, BMI = body mass index, HbA1c = glycated haemoglobin

On multivariate logistic regression, family history of DM (OR 1.77, p 0.001) and diabetic nephropathy (OR 24.31, p 0.001), higher BMI (>25 kg/m^2) (OR 2.11, p 0.013), hypertension (OR 4.31, p 0.003) and diabetic retinopathy (OR 14.09, p 0.021) were significant (Table III).

Table III Multi-variate logistic regression for risk factors for diabetic nephropathy among newly diagnosed T2DM subjects (N=100)

Risk factors	Odds ratio	p value
Age	0.231	0.067
Sex	1.21	0.278
Hypertension	4.31	0.003
Smoker	1.32	0.142
Family history of diabetes mellitus	1.77	0.001
Family history of diabetic nephropathy	24.31	0.001
BMI	2.11	0.013
Presence of diabetic retinopathy	14.09	0.021
HbA1c	2.11	0.061

T2DM = type 2 diabetes mellitus, BMI = body mass index, HbA1c = glycated haemoglobin

Discussion

Diabetic nephropathy is becoming the leading cause of CKD and end-stage renal disease through-out the world. Long duration of diabetes, poor glycaemic control, concomitant hypertension, smoking, family history of nephropathy are established risk factors for diabetic nephropathy.[3-5,7-10] As T2DM subjects may remain undiagnosed, patients may develop complications before diabetes is detected. In the present study we found one-third of the newly detected T2DM subjects had diabetic nephropathy. Family history of DM and diabetic nephropathy, higher BMI, presence of hypertension and diabetic retinopathy were significant risk factors for diabetic nephropathy.

Risk factors in our study reports were not different from different studies conducted in many Asian countries including India[11-14] and Pakistan.[5] The frequency of diabetic nephropathy varied widely in these reports principally due to different diagnostic criteria used. But the risk factors remained the same.

The scenario regarding frequency and risk factors for nephropathy among incident T2DM patients are not different in developed countries and the pathogenic mechanisms linked are oxidative stress, low level inflammation and genetic factors.[15] They also found high HbA1c at diagnosis of diabetes as an important risk factor. Other risk factors included family history, hypertension and other microvascular complications in western societies.

Microalbuminuria is the earliest sign of diabetic nephropathy. Patients remain asymptomatic at this early stage. Good glycaemic control, control of hypertension specially by using angiotensin blocking agents [angiotensin converting enzyme inhibitors (ACEI) or angiotensin receptor blocker (ARB)] may reverse proteinuria at this early stage.[16-18] So, identification of microalbuminuria is important for better patient and renal outcomes.

Our study had some limitations. This was a single center study and included limited number of patients. Such study, including larger study participants and in multiple centers would give a more representative result.

In conclusion, one-third of the newly detected T2DM subjects had diabetic nephropathy in this study. Family history of DM and nephropathy, higher BMI, presence of hypertension and diabetic retinopathy were significant risk factors for diabetic nephropathy.

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Conflict of interest: Nothing to declare.

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